CONTENTS OF VOLUME 114 · 1998

Oecologia

In Cooperation with the
International Association for Ecology (Intecol)

Editors in Chief

J.R. Ehleringer, Salt Lake City
M. Schaefer, Göttingen
E.-D. Schulze, Bayreuth
D.R. Strong, Bodega Bay

Editorial Board

I. Baldwin, Jena
M.C. Ball, Canberra
F.A. Bazzaz, Cambridge
J. Blondel, Montpellier
W.J. Bond, Rondebosch
R. Brandl, Bad Lauchstädt
J.J. Burdon, Canberra
M.M. Caldwell, Logan
B. Casper, Philadelphia
P.D. Coley, Salt Lake City
M.J. Crawley, Ascot
T. Dawson, Ithaca
P.J. Den Boer, Wijster
P. Doherty, Townsville
P.R. Ehrlich, Stanford
G.D. Farquhar, Canberra
K. Fiedler, Bayreuth
H.C.J. Godfray, Ascot
I. Hanski, Helsinki
A. Hastings, Davis
H. Heilmeier, Tharandt
T. Hirose, Sendai
P. Högberg, Umeå
D. Hollinger, Durham
L.E. Hurd, Lexington
S. Jonasson, Copenhagen
A. Knapp, Manhattan
C. Körner, Basel
S.L. Kohler, Champaign
O.L. Lange, Würzburg
J.H. Lawton, Ascot
M. Mangel, Santa Cruz
S. McNaughton, Syracuse
D.B. Miles, Athens
R. Monson, Boulder
K. Nadelhoffer, Woods Hole
K. Nagy, Los Angeles
D. Neumann, Köln
R. Oren, Durham
C. Osenberg, Gainesville
C. Otto, Umeå
J.S. Pate, Nedland
R.W. Pearcy, Davis
C.H. Peterson, Morehead City
S.L. Pimm, Knoxville
L. Pitelka, Frostburg
A. Polle, Göttingen
M. Price, Riverside
J. Rosenheim, Davis
O. Sala, Buenos Aires
J. Sarukhan, Mexico
S. Scheu, Darmstadt
B. Schmid, Zürich
J. Shykoff, Orsay
D. Simberloff, Knoxville
K. Spitze, Coral Gables
M.L. Stanton, Davis
A. Steward-Oaten, Santa Barbara
G. Stewart, Brisbane
P. Stiling, Tampa
T. Tscharntke, Göttingen
M.J. Vanni, Oxford
D. Wall, Ford Collins
A. Watkinson, Norwich
W. Wieser, Innsbruck
V. Wolters, Giessen
H. Ziegler, München

Springer

Oecologia

Derived from "*Zeitschrift für Morphologie und Ökologie der Tiere*", *Oecologia* was founded in 1968, volumes (1968–1982), and edited by H. Remmert. As of volume 53 (1982) the journal has been edited by both H. Remmert and E.-D. Schulze. As of volume 81 (1989) the journal has been edited by J.R. Ehleringer, Salt Lake City; C.H. Peterson, Morehead City; H. Remmert, Marburg; E.-D. Schulze, Bayreuth. As of volume 83 (1990) the journal has been edited by J.R. Ehleringer, Salt Lake City; C.H. Peterson, Morehead City; M. Schaefer, Göttingen; E.-D. Schulze, Bayreuth. As of volume 110 (1997) the journal has been edited by J.R. Ehleringer, Salt Lake City; M. Schaefer, Göttingen; E.-D. Schulze, Bayreuth; D.R. Strong, Bodega Bay.

Copyright

Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints), all translation rights as well as the rights to publish the article in any electronic form. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The Canada Institute for Scientific and Technical Information (CISTI) provides a comprehensive, world-wide document delivery service for all Springer-Verlag journals. For more information, or to place an order for a copyright-cleared Springer-Verlag document, please contact Client Assistant, Document Delivery, Canada Institute for Scientific and Technical Information, Ottawa K1A OS2, Canada (Tel: 613-993-9251; FAX: 613-952-8243; e-mail: cisti.docdel@nrc.-ca).

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Special regulations for photocopies in the USA: Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0029-8549, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

Printers:

Typesetter: SPS, Madras
Printer:
H. Stürtz AG,
Würzburg

© Springer-Verlag Berlin Heidelberg 1998

Springer-Verlag GmbH & Co. KG,
Berlin, Germany

Printed in Germany

Springer

Contents

Adler PH → McCreadie JW
Aho K, Huntly N, Moen J, Oksanen T: Pikas (*Ochotona princeps*: Lagomorpha) as allogenic engineers in an alpine ecosystem 405
Alatalo RV → Parri S
Almeida S → Martinelli LA
Anderson CR → Taylor BW

Babbitt KJ, Tanner GW: Effects of cover and predator size on survivaland development of Rana utricularia tadpoles 258
Backeljau T → Desender K
Bazzaz FA → Wayne PM
Bergeron Y → Cappuccino N
Berry JA → Collatz GJ
Beukers JS, Jones GP: Habitat complexity modifies the impact of piscivores on a coral reef fish population 50
Boeken B, Lipchin C, Gutterman Y, Rooyen NV: Annual plant community responses to density of small-scale soil disturbances in the Negev Desert of Israel 106
Bogie DS → Fitter AH
Bost CA → Charrassin J-B
Bowman WD → Reich PB
Brévault T → Rodet G
Briones O → Hietz P
Brown D → Krause J
Brown IF → Martinelli LA
Brown TK → Fitter AH

Cabrera HM, Rada F, Cavieres L: Effects of temperature on photosynthesis of two morphologically contrasting plant species along an altitudinal gradient in the tropical high Andes 145
Callaway RM, Pennings SC: Impact of a parasitic plant on the zonation of two salt marsh perennials
Cappuccino N , Lavertu D, Bergeron Y, Régnière J: Spruce budworm impact, abundance and parasitism ratein a patchy landscape 236
Cavieres L → Cabrera HM
Charrassin J-B, Bost CA, Pütz K, Lage T, Dahier T, Zorn T, Le Maho Y: Foraging strategies of incubating and brooding king penguins Aptenodytes patagonicus 194
Clark JS → Collatz GJ
Collatz GJ, Berry JA, Clark JS: Effects of climate and atmospheric CO_2 partial pressure on the global distribution of C_4 grasses: present, past, and future 441
Corbet SA: Fruit and seed production in relation to pollination and resources in bluebell, *Hyacinthoides non-scripta* 349
Crist TO: The spatial distribution of termites in shortgrass steppe: a geostatistical approach 410
Currie D → Nour N

Dahier T → Charrassin J-B
Dalling JW → Tyree MT
Damme RV → Nour N
de A. Sá TD → Hölscher D
de la Cruz C → de Lope F
de Lope F, Møller AP, de la Cruz C: Parasitism, immune response and reproductive success in the house martin Delichon urbical 188
Debouzie D → Desouhant E
Delahaye K → Desender K
Denich M → Hölscher D
Desender K, Backeljau T, Delahaye K, Meester LD: Age and size of European saltmarshes and the population genetic consequences for ground beetles 503
Desouhant E, Debouzie D, Menu F: Oviposition pattern of phytophagous insects: on the importance of host population heterogeneity 382
Dhondt AA → Nour N
Dixon AFG, Kundu R: Resource tracking in aphids: programmed reproductive strategies anticipate seasonal trends in habitat quality 73

Ellsworth DS → Reich PB
Elmberg J → Pöysä H

Fölster H → Hölscher D
Feener DH Jr. → Morehead SA
Ferreira CAC → Martinelli LA
Fitter AH, Graves JD, Self GK, Brown TK, Bogie DS, Taylor K: Root production, turnover and respiration under two grassland types along an altitudinal gradient: influence of temperature and solar radiation 20
Fleming TH, Holland JN: The evolution of obligate pollination mutualisms: senita cactus and senita moth 368
Frank DA → Tracy BF

Gauthier G → Lepage D
Godin J-GJ → Krause J
Gower ST → Kloeppel BD
Graves JD → Fitter AH
Gresham C → Reich PB
Grigg GC → Schäuble CS
Grill CP, Moore AJ: Effects of a larval antipredator response and larval dieton adult phenotype in an aposematic ladybird beetle 274
Grundel R, Pavlovic NB, Sulzman CL: The effect of canopy cover and seasonal change on host plant qualityfor the endangered Karner blue butterfly (Lycaeides melissa samuelis) 243
Gugerli F: Effect of elevation on sexual reproduction in alpine populations of *Saxifraga oppositifolia* (Saxifragaceae) 60
Gutterman Y → Boeken B

Hölscher D, de A. Sá TD, Möller RF, Denich M, Fölster H: Rainfall partitioning and related hydrochemical fluxes in a diverse and in a mono specific (*Phenakospermum guyannense*) secondary vegetation stand in eastern Amazonia 251
Hakkarainen H, Ilmonen P, Koivunen V, Korpimäki E: Blood parasites and nest defense behaviour of Tengmalm's owls 574
Hakkarainen H, Korpimäki E: Why do territorial male Tengmalm's owls fail to obtain a mate? 578
Hamerlynck EP → Huxman TE
Hart DD, Merz RA: Predator-prey interactions in a benthic stream community: a field test of flow-mediated refuges 263
Hayashida M → Yagihashi T
Hewitt N: Seed size and shade-tolerance: a comparative analysis of North American temperate trees 432
Hibbard K → Pan Y
Hietz P, Briones O: Correlation between water relations and within-canopy distribution of epiphytic ferns in a Mexican cloud forest 305
Hirose T → Shitaka Y
Hoffmann JH, Moran VC: The population dynamics of an introduced tree, *Sesbania punicea*, in South Africa, in response to long-term damage caused by different combinations of three species of biological control agents 343
Holland JN → Fleming TH
Holopainen JK → Kainulainen P
Holopainen T → Kainulainen P
Horton JL, Neufeld HS: Photosynthetic responses of *Microstegium vimineum* (Trin.) A. Camus, a shade-tolerant, C_4 grass, to variable light environments 11
Hunt HW → Morgan JA
Huntly N → Aho K
Huxman TE, Hamerlynck EP, Jordan DN, Salsman KJ, Smith SD: The effects of parental CO_2 environment on seed qualityand subsequent seedling performance in Bromus rubens 202

Ilmonen P → Hakkarainen H
Insausti P → Quinos PM

Jameson, jr EW: Prepartum mammogenesis, milk production, and optimal litters 288
Jantz B, Neumann D: Growth and reproductive cycle of the zebra mussel in the River Rhine as studied in a river bypass 213
Jones GP → Beukers JS
Jordan DN → Huxman TE
jr EW → Jameson

Kainulainen P, Holopainen JK, Holopainen T: The influence of elevated CO_2 and O_3 concentrations on Scots pine needles: changes in starch and secondary metabolites over three exposure years 455
Karasov WH → McWilliams SR
Kharuk S → Kloeppel BD
Kicklighter DW → Pan Y
Kinoshita M: Effects of time-dependent intraspecific competition on offspring survival in the butterfly, *Anthocharis scolymus* (L.) (Lepidoptera: Pleridae)

Kloeppel BD, Gower ST, Treichel IW, Kharuk S: Foliar carbon isotope discrimination in Larix species and sympatric evergreen conifers: a global comparison 153
Knight WG → Morgan JA
Koivunen V → Hakkarainen H
Koizumi H → Muraoka H
Korpimäki E → Hakkarainen H
Korpimäki E → Hakkarainen H
Krause J, Godin J-GJ, Brown D: Body length variation within multi-species fish shoals: the effects of shoal size and number of species 67
Kundu R → Dixon AFG

Lage T → Charrassin J-B
Lavertu D → Cappuccino N
Le Maho Y → Charrassin J-B
LeCain DR → Morgan JA
Lepage D, Gauthier G, Reed A: Seasonal variation in growth of greater snow goose goslings: the role of food supply 226
Lipchin C → Boeken B
Litvak ME, Monson RK: Patterns of induced and constitutive monoterpene productionin conifer needles in relation to insect herbivory 531

Møller AP → de Lope F
Møller AP, Sorci G: Insect preference for symmetrical artificial flowers 37
Möller RF → Hölscher D
Mappes J → Parri S
Martinelli LA, Almeida S, Brown IF, Moreira MZ, Victoria RL, Sternberg LSL, Ferreira CAC, Thomas WW: Stable carbon isotope ratio of tree leaves, boles and fine litter in a tropical forest in Rondônia, Brazil 170
Marvin GA: Territorial behavior of the plethodontid salamander *plethodon kentucki*: influence of habitat structure and population density 133
Matthysen E → Nour N
Matthysen E → Van Dyck H
McCreadie JW, Adler PH: Scale, time, space, and predictability: species distributions of preimaginal black flies (Diptera: Simuliidae) 79
McGuire AD → Pan Y
McManus MG, Travis J: Effects of temperature and salinity on the life history of the sailfin molly (Pisces: Poeciliidae): lipid storage and reproductive allocation 317
McWilliams SR, Karasov WH: Test of a digestion optimization model: effect of variable-reward feeding schedules on digestive performance of a migratory bird 160
Medina E → Suárez N
Meester LD → Desender K
Melillo JM → Pan Y
Menu F → Desouhant E
Merz RA → Hart DD
Miyamoto T → Yagihashi T
Moen J → Aho K
Monson RK → Litvak ME
Moore AJ → Grill CP
Moran VC → Hoffmann JH
Morehead SA, Feener DH Jr.: Foraging behavior and morphology: seed selection in the harvester ant genus, *Pogonomyrmex* 548
Moreira MZ → Martinelli LA
Morgan JA, LeCain DR, Read JJ, Hunt HW, Knight WG: Photosynthetic pathway and ontogeny affect water relations and the impact of CO_2 on *Bouteloua gracilis* (C_4) and *Pascopyrum smithii* (C_3) 483
Muñoz AA, Ojeda FP: Guild structure of carnivorous intertidal fishes of the Chilean coast:implications of ontogenetic dietary shifts 563
Muraoka H, Tang Y, Koizumi H, Washitani I: Combined effects of light and water availability on photosynthesis and growth of Arisaema heterophyllum in the forest understory and an open site 292

Neufeld HS → Horton JL
Neumann D → Jantz B
Nour N, Currie D, Matthysen E, Damme RV, Dhondt AA: Effects of habitat fragmentation on provisioning rates, diet and breeding success in two species of tit (great tit and blue tit) 522
Nummi P → Pöysä H

Ojeda FP → Muñoz AA
Ojima DS → Pan Y
Oksanen T → Aho K
Other VEMAP members → Pan Y

Pöysä H, Elmberg J, Sjöberg K, Nummi P: Habitat selection rules in breeding mallards (Anas platyrhynchos): a test of two competing hypotheses 283
Pütz K → Charrassin J-B
Pan Y, Melillo JM, McGuire AD, Kicklighter DW, Pitelka LF, Hibbard K, Pierce LL, Running SW, Ojima DS, Parton WJ, Schimel DS, Other VEMAP members: Modeled responses of terrestrial ecosystems to elevated atmospheric CO_2: a comparison of simulations by the biogeochemistry models of the Vegetation/Ecosystem Modeling and Analysis Project (VEMAP) 389
Parri S, Alatalo RV, Mappes J: Do female leaf beetles *Galerucella nymphaeae* choose their mates and does it matter? 127
Parton WJ → Pan Y
Pavlovic NB → Grundel R
Pearcy RW → Valladares F
Peckarsky BL → Taylor BW
Pennings SC → Callaway RM
Pfister CA: Extinction, colonization, and species occupancy in tidepool fishes 118
Pierce LL → Pan Y
Pitelka LF → Pan Y

Quinos PM, Insausti P, Soriano A: Facilitative effect of *Lotus tenuis* on *Paspalum dilatatum* in a lowland grassland of Argentina 427

Régnière J → Cappuccino N

Rada F → Cabrera HM
Raps A, Vidal S: Indirect effects of an unspecialized endophytic fungus on specialized plant – herbivorous insect interactions 541
Read JJ → Morgan JA
Read JL: Are geckos useful bioindicators of air pollution? 180
Reed A → Lepage D
Reekie EG → Wayne PM
Reich PB, Walters MB, Ellsworth DS, Vose JM, Volin JC, Gresham C, Bowman WD: Relationships of leaf dark respiration to leaf nitrogen, specific leaf area and leaf life-span: a test across biomes and functional groups 471
Rodet G, Vaissière BE, Brévault T, Torre Grossa J-P: Status of self-pollen in bee pollination efficiency of white clover (*Trifolium repens* L.) 93
Rooyen NV → Boeken B
Rowcliffe JM, Watkinson AR, Sutherland WJ: Aggregative responses of brent geese on salt marsh and their impact on plant community dynamics 417
Running SW → Pan Y

Salsman KJ → Huxman TE
Schäuble CS, Grigg GC: Thermal ecology of the Australian agamid *Pogona barbata* 461
Schimel DS → Pan Y
Seki S-I, Takano H: Caterpillar abundance in the territory affects the breeding performance of great tit *Parus major minor* 514
Self GK → Fitter AH
Shitaka Y, Hirose T: Effects of shift in flowering time on the reproductive output of *Xanthium canadense* in a seasonal environment 361
Sjöberg K → Pöysä H
Smith SD → Huxman TE
Sobrado MA → Suárez N
Sorci G → Møller AP
Soriano A → Quinos PM
Sternberg LSL → Martinelli LA
Suárez N, Sobrado MA, Medina E: Salinity effects on the leaf water relations components and ion accumulation patterns in *Avicennia germinans* (L.) L. seedlings 299
Sulzman CL → Grundel R
Sutherland WJ → Rowcliffe JM

Takano H → Seki S-I
Tang Y → Muraoka H
Tanner GW → Babbitt KJ
Taylor BW, Anderson CR, Peckarsky BL: Effects of size at metamorphosis on stonefly fecundity, longevity, and reproductive success 494
Taylor K → Fitter AH
Thórhallsdóttir TE: Flowering phenology in the central highland of Iceland and implications for climatic warming in the Arctic 43
Thomas WW → Martinelli LA
Torre Grossa J-P → Rodet G
Tracy BF, Frank DA: Herbivore influence on soil microbial biomass and nitrogen

mineralization in a northern grassland ecosystem: Yellowstone National Park 556
Travis J → McManus MG
Treichel IW → Kloeppel BD
Tyree MT, Velez V, Dalling JW: Growth dynamics of root and shoot hydraulic conductance in seedlings of five neotropical tree species: scaling to show possible adaptation to differing light regimes 293

Underwood NC: The timing of induced resistance and induced susceptibility in the soybean-Mexican bean beetle system 376

Vaissière BE → Rodet G
Valladares F, Pearcy RW: The functional ecology of shoot architecture in sun and shade plants of *Heteromeles arbutifolia* M. Roem., a Californian chaparral shrub 1
Van Dyck H, Matthysen E: Thermoregulatory differences between phenotypes in the speckled wood butterfly: hot perchers and cold patrollers? 326
Velez V → Tyree MT
Victoria RL → Martinelli LA
Vidal S → Raps A
Volin JC → Reich PB
Vose JM → Reich PB

Walters MB → Reich PB
Washitani I → Muraoka H
Watkinson AR → Rowcliffe JM
Wayne PM, Reekie EG, Bazzaz FA: Elevated CO_2 ameliorates birch response to high temperature and frost stress: implications for modeling climate-induced geographic range shifts 335

Yagihashi T, Hayashida M, Miyamoto T: Effects of bird ingestion on seed germination of Sorbus commixta 209

Zorn T → Charrassin J-B

Indexed in *Current Contents*

Index of key words

Abies balsamea 236
Acclimation 20
Acremonium alternatum 541
Aggression 133
Allometry 548
Alpine plants 60
Amazon 170
Anas platyrhynchos 283
Anthocharis scolymus (L.) 31
Aposematic coloration 274
Aptenodytes patagonicus 194
Arctic 43
Arctic geese 226
Argentina 427
Arid zone 180
Atmospheric pollution 180
Atriplex canescens 410
Avicennia germinans 299

Betula 335
Biodiversity 503
Biogeochemistry 389
Bioindicators 180
Biological control 343
Bird ingestion 209
Bird migration 160
Black fly larvae 263
Blood parasites 574
Blue grama (*Bouteloua gracilis*) 483
Body size 73
Boreal forest 236
Branta bernicla 417
Breeding performance 514
Breeding stage 194
Breeding success 522
Breeding system 60
Bromus rubens 202
Butterflies 326
Butterfly conservation 243

C/N ratio 202
C_4 441
C_4 pathway 11
Cabbage phytosterols 541
δ^{13} Carbon 153
Carbon cycle 20
Carbon dioxide 335
Carbon dioxide 389
Carbon dioxide 455
Carbon dioxide 483
Caterpillar 514
Cavariella aegopodii 73
Cell elasticity 299
Chemical defense 274
Chestnut weevil 382
Chilean coast 563
Choristoneura fumiferana 236
Climate change 335
Climate change 441
Cloud forest 305
CO_2 441
Coccinellidae 274
Communities 100
Comparative method 432
Competition 100
Competition 427
Conspecific attraction 283
Consumers 100
Coral reef fish 50
Cost of immune response 188
Cost of reproduction 361
Cross-correlation 410
Current speed 263

Dendroica coronata 160
Developmental stability 37
Diet 522
Diving 194
Dreissena polymorpha 213
Drumming 494

Eclosion timing 31
Ecoregion 79
Egg cannibalism 31
Elevated CO_2 202
Elevation 60
Enemies hypothesis 236
Energy allocation 317
Energy balance 145
Epilachna varivestis 376
Epiphyte 305
Establishment conditions 432

Facilitation 427
Feeding schedule 160
Fern 305
Fish shoaling behaviour 67
Flatworms 263
Flooding pampa 427
Flowering phenology 43
Fluctuating asymmetry 37
Foliar nitrogen 153
Food availability 514
Food supply 226
Foraging strategy 194
Foraging theory 548
Forest 170
Forest size 522
Frass trap 514
Freezing stress 335
Fruit development 349
Fruit pulp 209
Functional groups 471
Functional plant architecture 1
Fundulus diaphanus 67
Fungal endophytes 541

Galerucella nymphaeae 127
Gammaglobulins 188
Gekkonidae 180
Genetic differentiation 503
Global change 389
Global change 483
Global warming 43
Glycine max 376
Gonad size 73
Grass-legume interactions 427
Grassland 441
Grazing 417
Grazing 556
Great tit 514
Ground beetles 503
Growth 213
Growth dynamics 293
Growth rate 226
Guilds 563
Gymnosperms 432

Habitat complexity 258
Habitat fragmentation 503
Habitat patches 118
Habitat quality 1
Habitat quality 73
Habitat selection 283
Harmonia axyridis 274
heat stress 335
Herbivory 251
Herbivory 405
Herbivory 417
Heteromeles arbutifolia 1
Home range 133
Honeybees 93
Host heterogeneity 382
Host plant quality 243
Host-parasite interactions 188
Host-plant density 343
Hydraulic conductance 293

Iceland 43
Ideal preemptive distribution 283
Immunoglobulins 188
Incidence functions 118
Indirect effects 100
Indirect effects 251
Indirect effects 263
Indirect effects 405
Induced resistance 376
Induced susceptibility 376
Induction 11
Inhibition of germination 209
Insect herbivory 343
Insular habitats 118
Intertidal fishes 563
Ion accumulation 299

Landscape diversity 236
Leaf beetle 127
Leaf life-span 471
Leaf temperature 145
Life history traits 317
Light harvesting 1
Lipoidal reserves 73
Lophocereus schottii 368
Lupinus perennis 243

Male size 127
Mate choice 1
Mate-locating strategies 326
Maternal effects 202
Metapopulations 118
Microhabitat complexity 50
Microorganisms 556
Microstegium vimineum 11

Minirhizotrons 20
Mojave Desert 202
Multitroptic intgractions 541

Needle age 153
Negative binomial distribution 382
Neotropical tree seedlings 293
Nest defense 574
Net primary production (NPP) 389
Nitrogen 251
Nitrogen 405
Nitrogen 471
Nitrogen mineralization 556
Notemigonus crysoleucas 67

Oeciacus hirundinis 188
Offspring survival 31
Offspring viability 127
Ontogenetic dietary shifts 563
Operative temperatures 461
Optimal digestion model 160
Optimal flowering 361
Osmotic potential 299
Oviposition pattern 382
Oviposition preference 31
Ovule position 349
Ozone 455

Pararge aegeria 326
Parasitic plants 100
Parental investment 574
Partitioning 483
Parus spp. 522
Penguin 194
Perennial weed 343
Phenology 243
Phenotypic plasticity 1
Phenotypic plasticity 317
Photoperiodic manipulation 361
Photosynthesis 11
Photosynthesis 441
Photosynthesis 1
Pinus sylvestris 455
Plant density 106
Plant morphology 145
Plant productivity 106
Plant sexual selection 37
Plant-herbivore interactions 376
Plutella xylostella 541
Pogona barbata 461
Pogonomyrmex 548
Pollen competition 93
Pollination 368
Pollination efficiency 93
Pollinator limitation 349
Pollinator rewards 37
Population limitation 283
Population regulation 50
Positive feedbacks 251
Positive feedbacks 405
Predation 258
Predation 50
Predictability 79
Prey refuges 263
Protandry 494
Provisioning 522
Puccinellia maritima 417

Radiotelemetry 461
Rana utricularia 258
Reflex bleeding 274
Reproduction 60
Reproductive cycle 213
Resource limitation 349
Respiration 471
Reticulitermes tibialis 410
Risk-sensitive foraging 160
River bypass 213
River Rhine 213
Rondônia 170
Root 293
Root birth 20
Root death 20

Salamander 133
Salicornia europaea 417
Salinity 299
Scale 79
Sculpins 118
Seasonal environment 361
Seasonal variation 226
Secondary metabolites 455
Seed development 349
Seed size 432
Selected range 461
Self-pollen 93
Self-pollination 60
Semivariance 410
Sex ratio 1
Sexual selection 1
Sexual selection 127
Sexual size dimorphism 494
Shade 243
Shoot 293
Simuliidae 79
Size at metamorphosis 494
Size-assortativeness 67
Size-limited predation 258
Slope direction 106
Social organization 133
Soil disturbance 106
Soils 251
Soils 405
Sonoran Desert 368
Spatial scale 410
Species composition 67
Species distributions 79
Species richness 106
Specific leaf area 153
Specific leaf area 471
Stable carbon isotope 170
Starch 455
Sulphur dioxide 180
Sunflecks 11
Survivorship 50

Temperate trees 432
Temperature 317
Tengmalm's owl 574
Territorial behavior 133
Territorial non-breeder 1
Thermoregulation 326
Thermoregulation 461
Time costs 548
Timing of reproduction 226
Topography 556
Total lifetime fecundity 494
Tramea carolina 258
Triacylglycerol 317
Tropical mountain 145
Trypanosomes 574

Upiga virescens 368

Vegetation 170
Vegetation/Ecosystem Modeling and Analysis Project (VEMAP) 389

Water relations 305
Water use efficiency 153
Western wheatgrass (*Pascopyrum smithii*) 483
White clover 93
Wing colour 326
Wing polymorphism 503

Xanthium canadense 361

Yellowstone 556
Yucca/yucca moths 368

Zero inflated Poisson distribution 382